

**INTERIM CHANGE NOTICE
(ICN)**

0059470

<p>A. Document No.: PNNL-12114 Revision No.: September 1999</p> <p>Document Title: <u>RCRA Assessment Plan for Single-Shell Tank Waste Management Area S-SX at the Hanford Site, September 1999</u></p> <p>Document's Original Author: V. G. Johnson and C. J. Chou</p>	<p>Effective Date of ICN: 2/28/02</p> <hr/> <p>Change Requested By: Ronald M. Smith</p>
<p>B. Action: Make changes in the WMA S-SX groundwater quality assessment plan as described in Section D below. Attach this ICN to the front of the document</p>	
<p>C. Effect of Change: This ICN updates the assessment plan to reflect the current wells in the monitoring system and the current constituent list for WMA S-SX. This ICN supplements all previous ICNs (PNNL-12114-September 1999.1).</p>	
<p>D. Reason for Change/Description of Change:</p> <p style="padding-left: 20px;">Reason for Change: New wells have been constructed at WMA S-SX and some wells have gone dry because of a falling water table and can no longer be sampled. The constituent list has been modified to reflect constituents actually detected in the groundwater and to drop constituents that have not been detected and provide no additional beneficial information.</p> <p style="padding-left: 20px;">Description of Change: See attached.</p>	
<p>E. Document Management Decisions: See attached distribution list.</p> <div style="text-align: right; font-size: 24px; font-weight: bold; margin-top: 20px;"> RECEIVED MAY 27 2003 EDMC </div>	

F. Approval Signatures
(Please Sign and Date)

Process Quality Department: Thomas G Walker 2/25/02
T. G. Walker

Type of Change: (Check one):

Minor Major

Approval Authority: S. P. Luttrell

Date: 2/25/02

Other Approvals: Ronald M. Smith

Date: 2/25/02

Mary J Harman
M. J. Harman

Date: 25 Feb 02

Description of Changes

This ICN updates the groundwater monitoring network and schedule as they were described in the assessment plan (PNNL-12114) and ICN PNNL-12114-September 1999.1.

The groundwater monitoring network for single-shell tank Waste Management Area S-SX currently has 16 wells. Figure R2.A.2 shows the monitoring wells in the WMA S-SX monitoring network and replaces Figure A.2 (page 4) in ICN PNNL-12114-September 1999.1, which replaced Figure A.2 (page A.7) in the original assessment plan.

Changes to the groundwater monitoring network since ICN PNNL-12114-September 1999.1 became effective include the following:

- groundwater monitoring wells 299-W23-13, 299-W23-14, and 299-W22-39 are removed from the network because they are dry and can no longer be sampled,
- monitoring wells 299-W23-20 and 299-W23-21 are added to the network as new upgradient monitoring wells,
- monitoring wells 299-W22-80, 299-W22-81, 299-W22-82, 299-W22-83, 299-W22-84, and 299-W22-85 are added to the network as new downgradient monitoring wells.

Upgradient wells 299-W23-13 and 299-W23-14 can no longer be sampled because the water table has fallen below the well-screen interval. New monitoring wells 299-W23-20 and 299-W23-21 replace monitoring wells 299-W23-13 and 299-W23-14, respectively. Wells 299-W23-20 and 299-W23-21 have sample interval depths capable for monitoring the top of the unconfined aquifer. Downgradient well 299-W22-39 can no longer be sampled because the water table has fallen below the well-screen interval. The new downgradient monitoring wells were added to the network to enhance the spatial monitoring coverage.

As-built diagrams and well construction summary reports for new wells 299-W22-80, 299-W22-81, 299-W22-82, 299-W22-83, 299-W22-84, 299-W22-85, 299-W23-20, and 299-W23-21 are attached to this ICN.

The monitoring schedule is shown in Table R2.1. Changes to the monitoring schedule since ICN PNNL-12114-September 1999.1 became effective include:

- removal of gross alpha/beta, strontium-90, and iodine-129 from the quarterly monitoring schedule,
- reducing the frequency of monitoring for gamma scan, which includes cesium-137, from quarterly to annual,
- removal of total organic carbon (TOC) and laboratory-measured specific conductance from the quarterly monitoring schedule.

Gross alpha/beta are removed from the monitoring schedule because specific analyses for technetium-99 and uranium make routine gross alpha/beta monitoring unnecessary. The only exception to this removal is quarterly gross beta monitoring at well 299-W23-19. Given the groundwater flow rate conditions at WMA S-SX and retardation characteristics of cesium-137, annual monitoring of this constituent, by gamma scan, is adequate. Strontium-90 and iodine-129 are removed from the quarterly schedule because they have not been detected in groundwater. Specific conductance (laboratory method) and TOC analyses are removed from the monitoring schedule because they provide no additional beneficial information.

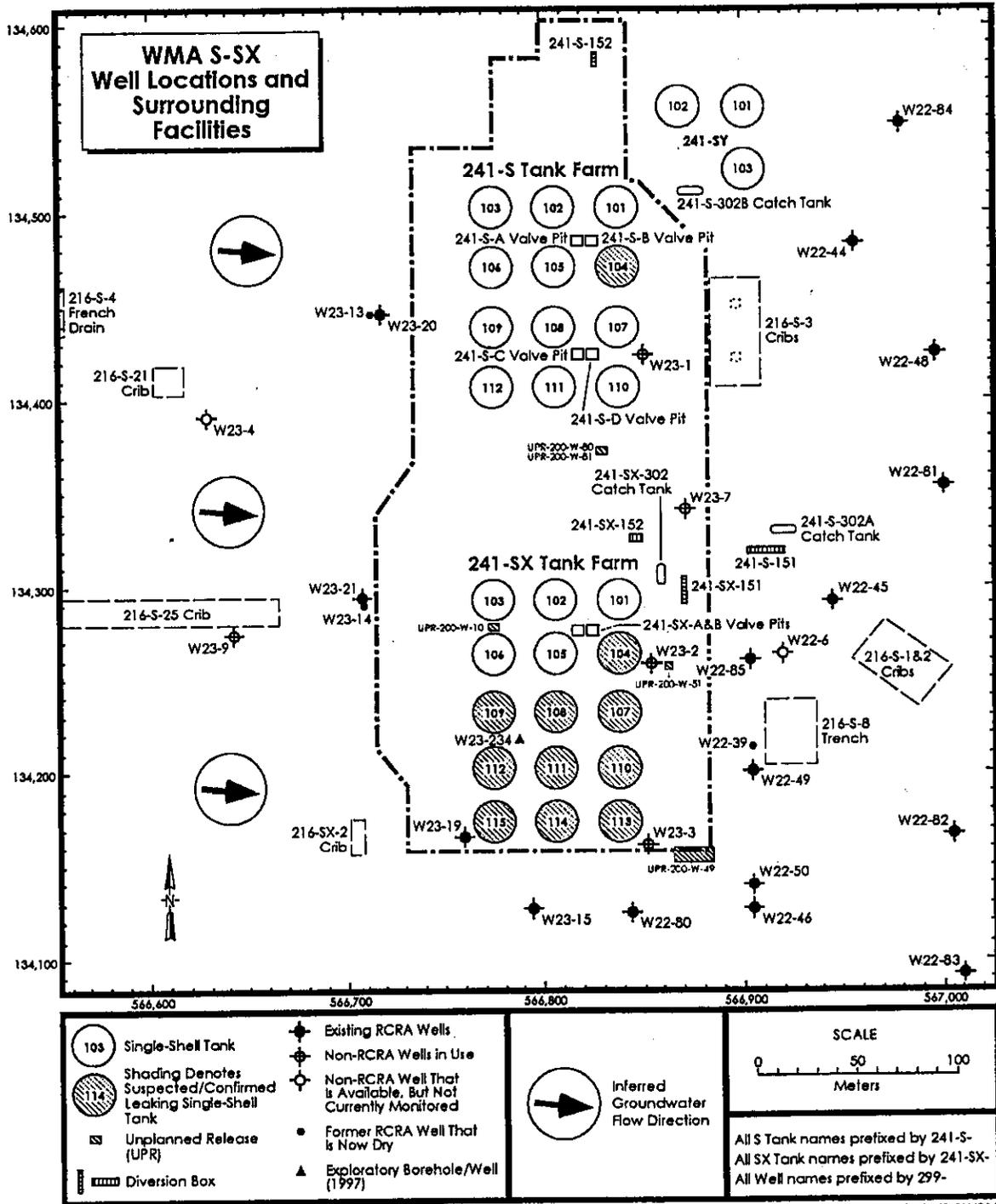


Figure R2.A.2. Location Map of Existing Wells Around Waste Management Area S-SX

Table R2.1. Assessment Monitoring Network, Constituent List, and Sampling Frequency for WMA S-SX.

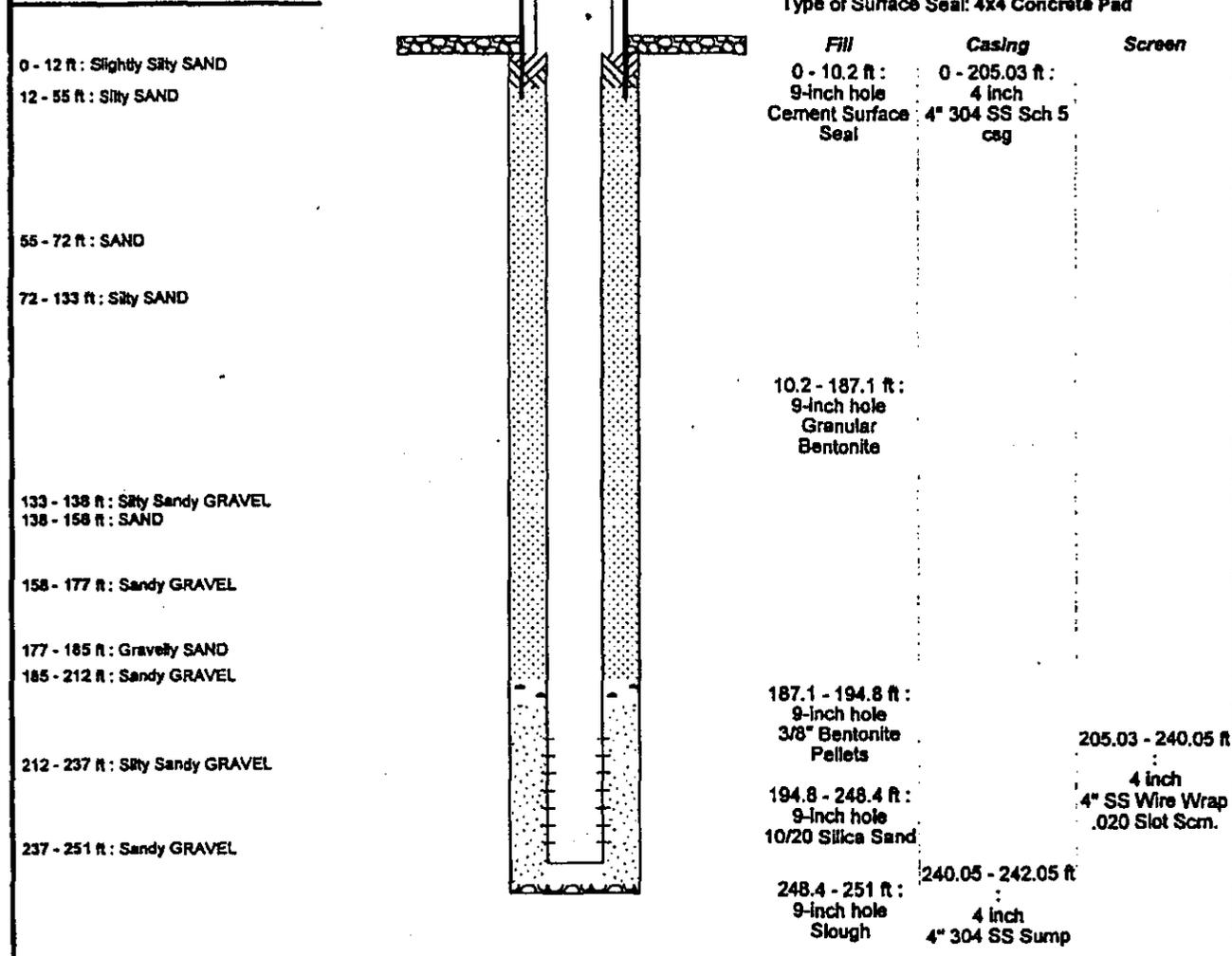
Well	Alkalinity	Anions	Anions (w/Br ⁻)	Gross Beta	Metals	Gamma	Technetium-99	Tritium	Uranium	Strontium-90	Iodine-129	TOC
299-W22-44	Q	Q	-	-	Q	-	Q	Q	Q	-	-	-
299-W22-45	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W22-46	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W22-48	Q	Q	-	-	Q	-	Q	Q	Q	-	-	-
299-W22-49	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W22-50	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W22-80	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W22-81	Q	Q	-	-	Q	-	Q	Q	Q	-	-	-
299-W22-82	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W22-83	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W22-84	Q	Q	-	Sep/02	Q	Sep/02	Q	Q	Q	Sep/02	Sep/02	Sep/02
299-W22-85	Q	-	Q	Sep/02	Q	Sep/02	Q	Q	Q	Sep/02	Sep/02	Sep/02
299-W23-15	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W23-19	Q	-	Q	Q	Q	A	Q	Q	Q	-	-	-
299-W23-20	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-
299-W23-21	Q	-	Q	-	Q	-	Q	Q	Q	-	-	-

Notes:
Q = Quarterly; A = Annual; Sep/02 = Analyzed for the last time in September 2002 after four quarters of samples have been collected.
- = Indicates that the analysis will not be conducted.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Air Rotary Csg. Hammer Drilling Fluid Used: Air Driller's Name: M. Wraspir Drilling Company: RSI Date Started: 01Sep00	Sample Method: Grab/Spill Spoon Additives Used: None WA State Lic Nr: 1909 Company Location: Woodland, Ca. Date Completed: 11Sep00	WELL NUMBER: 299-W22-86 Coordinates: N: Not documented Coordinates: E: Not documented Start Card #: R043398 Elevation Ground Surface:	TEMPORARY WELL NO: C3115 Not Allowed
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Depth to Water: 205.29 ft. 11Sep00
Elevation of Reference Point: m
Height of Reference Point Above Ground Surface:
Depth of Surface Seal: 10.2 ft.
Type of Surface Seal: 4x4 Concrete Pad



251 ft : Borehole drilled depth

0 - 251 ft : 9-in. 8-5/8" CS Temp. Csg. set w/Air Rotary Casing Hammer

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 25Sep00
Print Date: 25Sep00



0526750

**SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W22-80**

WELL DESIGNATION : 299-W22-80
CERCLA UNIT :
RCRA FACILITY :
DEPTH DRILLED (GS) : 251.0 ft
MEASURED DEPTH (GS) : 242.05 11Sep00
AVAILABLE LOGS : Geologist
DATE EVALUATED : Data not available
EVAL RECOMMENDATION : Data not available
LISTED USE : RCRA monitoring/sampling

CURRENT USER : RCRA & Operations

PUMP TYPE : Hydrostar
MAINTENANCE : Data not available
COMMENTS : Air Rotary Casing Hammer 8-5/8" CS csg to 251'

TV SCAN COMMENTS :

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 25Sep00
Print Date: 25Sep00



WELL CONSTRUCTION SUMMARY REPORT 0526566				Start Date: 9-1-00			
				Finish Date: 9-11-00			
				Page 1 of 1			
Specification No.:		Rev. No.:		Well Name: 299-W22-80		Temp. Well No.: C3115	
ECNs:		Approximate Location: S. of 241- TX Tank Farm / 200W					
Project: CY 2000 RCRA Drilling		Other Companies: CHI					
Drilling Company: Resonant Sonic Int.		Geologist(s): T. Lee					
Driller: Kelly Cowden		L. Walker					
TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD/NO. DIAMETER				
*Size/Grade/Lbs. Per Ft	Interval	Shoe O.D./I.D.	Auger:	Diameter From _____ to _____			
(FJ) Carbon Steel	0' - 250.3	9" / 7 7/8"	Cable Tool:	Diameter From _____ to _____			
			Air Rotary: <input checked="" type="checkbox"/> 8 7/8"	Diameter From 0' to 251'			
			A.R. w/Sonic:	Diameter From _____ to _____			
				Diameter From _____ to _____			
				Diameter From _____ to _____			
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter From _____ to _____			
			Drilling Fluid:				
Total Drilled Depth: 251'		Hole Dia @ TD: 9"		Total Amt. Of Water Added During Drilling:			
Well Straightness Test Results:			Static Water Level: 205.29'		Date: 9-11-00		
GEOPHYSICAL LOGGING							
Sondes (type)	Interval	Date	Sondes (type)	Interval	Date		
COMPLETED WELLS							
Size/WL/Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	Volume	Mesh Size
SS304L 4 1/4" casing	+2.2 - 205.03		NA	Portland Cement Grout	0' - 10.2'	7 bags	NA
4 1/4" SS304L Screen	205.03' - 240.05'		0.020	Bentonite, granular	10.2' - 187.1'	76 bags	
4 1/4" SS304L Sump	240.05' - 242.05'		NA	Bentonite pellets	187.1' - 194.8'	5 bags	3/8"
				Colorado Silica Sand	194.8' - 248.4'	96 bags	10-20
OTHER ACTIVITIES:							
Aquifer Test Well Development		Date: 9-11-00		Well Abandoned:		Yes:	No:
Description: Monitor drawdown and recovery				Description:		Date:	
WELL SURVEY DATA:							
Date:				Protective Casing Elevation:			
Washington State Plane Coordinates:				Brass Cap Elevation:			
COMMENTS/REMARKS:							
Vol. Calcs: 10-20 Silica Sand - 0.54 Ft ³ /50-lb bag x 96 bags = 51.84 Ft ³ ; Bentonite pellets - 0.62 Ft ³ /bucket x 5 buckets = 3.1 Ft ³ ; Granular bentonite - 0.73 Ft ³ /50-lb bag x 76 bags = 55.48 Ft ³							
Reported By: L.D. Walker				Reviewed By: J. Ruten			
Title: Geologist		Date: 9-11-00		Title: Sr. Geol. Engr		Date: 9/11/00	
Signature: L.D. Walker				Signature: J. Ruten			

0526575

WELL SUMMARY SHEET

Well ID: <u>C 3115</u>	Well Name: <u>299-W22-80</u>
Location: <u>South of 241-TX Tank Farm / 200W</u>	Project: <u>CY 2000 RCRA Drilling</u>
Prepared By: <u>L.D. Walker</u>	Date: <u>9/11/00</u>
Reviewed By: <u>DC Weekes</u>	Date: <u>9/11/00</u>
Signature: <u>L.D. Walker</u>	Signature: <u>DC Weekes</u>

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA			
Description	Diagram		Graphic Log	Lithologic Description		
0' → 10.2': Portland Cement		0		0' → 12': Slightly Silty SAND		
6" Protective Casing						
0' → +3.2'						
+2.2' → 205.03': SS type 304 well casing, 4" ID / 4.5" OD				25		12' → 55': Silty SAND
10.2' → 187.1': Granular Bentonite				50		
						55' → 72': SAND
Temporary Casing 8 5/8" OD / 7 5/8" ID				75		72' → 133': Silty SAND
				100		
				125		
						133' → 138': Silty Sandy GRAVEL

All depths in feet below ground surface
All temp. casing removed.

WELL SUMMARY SHEET

Page 2 of 2
Date: 9-6-00

Well ID: <u>C3115</u>		Well Name: <u>299-W22-80</u>	
Location: <u>South of 241-TX Tank Farm/200W</u>		Project: <u>CY 2000 RCRA Drilling</u>	
Prepared By: <u>L. D. Walker</u>	Date: <u>9/11/00</u>	Reviewed By: <u>DC Weekes</u>	Date: <u>9/11/00</u>
Signature: <u>L. D. Walker</u>		Signature: <u>DC Weekes</u>	

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
		150		138' → 158': SAND
187.1' → 194.8': 3/8" Bentonite pellets		175		158' → 177': Sandy GRAVEL
194.8' → 248.4': Silica Sand, 10-20 mesh		200		177' → 185': Gravelly SAND
205.03' → 240.05': Well screen, type 304 SS, 0.020-in slot cont. wire-wrap, 4" ID / 4.5" OD		225		185' → 212': Sandy GRAVEL
240.05' → 242.05': Sump type 304 SS, 4" / 4.5"		250		212' → 237': Silty Sandy GRAVEL
248.4' → 251.0': SLUFF		275		237' → 251': Sandy GRAVEL
Total SS 4" / 4 1/2" material is 244.25' (± 2.2-242.05')		TD = 251 ft.		
All depths in feet below ground surface		W.L. = 205.29' bgs (9-11-00)		
All temp. casing removed from the ground				

0592885

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable Tool Drilling Fluid Used: none Driller's Name: Gary Howell Drilling Company: RSI Date Started: 09Jan01	Sample Method: Grab/Spilt Spoon Additives Used: water WA State Lic Nr: Not Available Company Location: Woodland, Ca. Date Completed: 31Jan01	WELL NUMBER: 299-W22-81 C3123 TEMPORARY WELL NO: Not Allowed Coordinates: N: Not documented Coordinates: E: Not documented Start Card #: Not Available Elevation Ground Surface:
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Depth to Water: 225.9 ft. 26Mar01
(Ground surface)

Elevation of Reference Point: m

GENERALIZED STRATIGRAPHY **Geologist's Log**

0 - 9.5 ft : Silty Sandy GRAVEL
 9.5 - 19 ft : Slightly Silty SAND
 19 - 34 ft : SAND

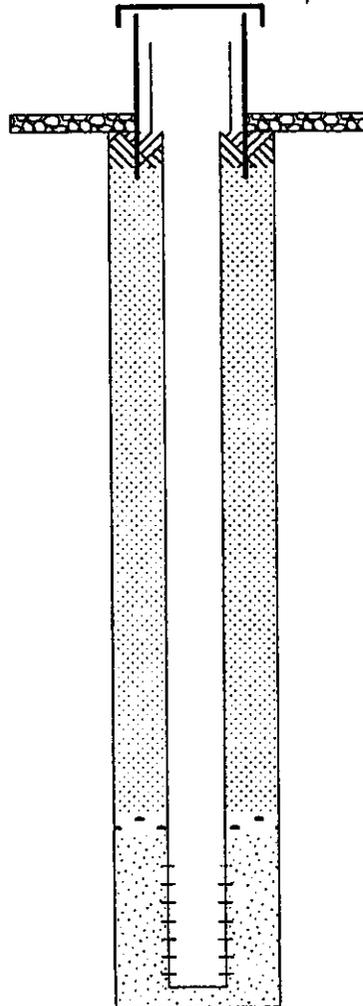
 34 - 40 ft : Slightly Silty SAND
 40 - 45 ft : Slightly Silty Gravelly SAND
 45 - 48 ft : Silty Sandy GRAVEL
 48 - 70 ft : Slightly Silty SAND

 70 - 140 ft : SAND

 140 - 163 ft : Silty SAND

 163 - 174 ft : Silty Sandy GRAVEL
 174 - 178 ft : Silty SAND
 178 - 259 ft : Silty Sandy GRAVEL

 259 - 270 ft : Sandy GRAVEL



Height of Reference Point Above Ground Surface:

Depth of Surface Seal: 11 ft.
Type of Surface Seal: 4x4 Concrete Pad

Fill	Casing	Screen
0 - 11 ft : 11-inch hole Cement Surface Seal	0 - 226.75 ft : 4 inch 4" 304L SS sch 5. csg.	

11 - 209.9 ft :
11-inch hole
Granular Bentonite

209.9 - 216.7 ft : 11-inch hole 3/8" Bentonite Pellets	226.75 - 261.72 ft : 4 inch 4" 304 SS .020 Slot Scrn.
216.7 - 263.72 ft : 11-inch hole 10/20 Silica Sand:	
263.72 - 270 ft : 11-inch hole 10/20 Silica Sand	261.72 - 263.72 ft : 4 inch 4" 304L SS sump

270 ft : Borehole drilled depth

0 - 270 ft : 11-in. 10-3/4" CS Temporary csg.

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 16Apr01
Print Date: 16Apr01



0534114

WELL CONSTRUCTION SUMMARY REPORT

Specification No.: 0200W-3P 0007	Rev. No.: 0	Well Name: 299-W22-81	Start Date: 1-9-01
ECNs: NA		Approximate Location: E. of 241 SX Tank Farm / 200 W	
Project: RCRA Drilling CY 2001		Other Companies: BHI, CHI	
Drilling Company: Resnant Sonic International		Geologist(s): L.D. Walker, P. Vellines, S.M. Faurst, C. Wright, S. Kester, J.K. Murray, DCWeekes	
Driller: Gary Howell		Temp. Well No.: C3123	

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD/HOLE DIAMETER	
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter From _____ to _____
Carbon Steel 10 5/8" / 9 5/8"	0 - 269'	11" / 9 5/8"	Cable Tool: 10 5/8" / 9 5/8"	Diameter From 0 to 269'
			Air Rotary:	Diameter From _____ to _____
			A.R. w/Sonic:	Diameter From _____ to _____
				Diameter From _____ to _____
				Diameter From _____ to _____

*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design

Drilling Fluid:

Total Drilled Depth: 270'	Hole Dia @ TD: 9"	Total Amt. Of Water Added During Drilling:
Well Straightness Test Results: <u>passed</u>	Static Water Level: 125.9' BGS	Date: 3/26/01

GEOPHYSICAL LOGGING					
Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
SPECTRAL GAMMA	0 - 268.75'	1/22/01			
NEUTRON	0 - 235.71'	1/22/01			

COMPLETED WELL							
Size/WL/Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	Volume	Mesh Size
4" ID SS End cap (ump)	261.72' - 263.72'	F480	NA				
4" ID 304 SS NWL screen	226.75' - 261.72'	F480	20	Portland cement	0 - 11'	9 bags	N/A
4" ID 304 SS casing (schedule 5)	+2' - 226.75'	F480	NA	Granular bentonite	11' - 209.9'	116.5 bags	N/A
				Bentonite pellets (3/8")	209.9' - 216.7'	6 bags	20"
				Silica Sand	216.7' - 270'	635 bags	10/20

OTHER ACTIVITIES					
Aquifer Test:	Date:	Well Abandoned:	Yes:	No:	Date:
Description:	Description:				

WELL SURVEY DATA	
Date:	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Cap Elevation:

COMMENTS/REMARKS

Portland cement in 94# bags, granular bentonite in 50# bags, bentonite pellets in 50# bags, silica sand in 50# bags.

Reported By: C. TRICE	Reviewed By: DCWeekes
Title: Geologist	Date: 2/10/01
Signature: [Signature]	Date: 4/11/01
Signature: [Signature]	Signature: [Signature]



0534139

<p>Page <u>1</u> of <u>2</u> Date: <u>2/5/01</u></p>	
<p>WELL SUMMARY SHEET</p>	
<p>Well ID: <u>299- C3123</u> Location: <u>EAST SIDE 241-5 TANK FARM</u> Prepared By: <u>J. MURRAY / DCWEEKES</u> Signature: <u>J. Murray / DCWeekes</u> Date: <u>2/5/01</u></p>	<p>Well Name: <u>299-W22-81</u> Project: <u>RCRA C42001</u> Reviewed By: <u>J. Murray</u> Signature: <u>J. Murray</u> Date: <u>02/05/01</u></p>
<p>CONSTRUCTION DATA</p>	
<p>Description</p> <p><u>6-in dia protective ss casing set 1' above the 4-in casing</u></p> <p><u>4-in ID sch 5 ss 304L well casing:</u> <u>+2' → 226.75'</u></p> <p><u>Portland cement grout:</u> <u>0' → 11'</u></p> <p><u>Granular bentonite:</u> <u>11' → 209.9'</u></p> <p><u>Temporary Casing:</u> <u>10 5/8" / 4 5/8" set 94 TD (269')</u></p> <p><u>All depths in feet below ground surface</u></p> <p><u>All temporary casing removed from the ground</u></p>	<p>Diagram</p>
<p>GEOLOGIC/HYDROLOGIC DATA</p>	
<p>Depth in Feet</p> <p>0</p> <p>25</p> <p>50</p> <p>75</p> <p>100</p> <p>125</p>	<p>Graphic Log</p>
<p>Lithologic Description</p> <p><u>0'-9.5' SILTY SANDY GRAVEL</u></p> <p><u>9.5'-19' SLIGHTLY SILTY SAND</u></p> <p><u>19'-34' SAND</u></p> <p><u>34'-40' SLIGHTLY SILTY SAND</u></p> <p><u>40'-45' SLIGHTLY SILT GRAVELLY SAND</u></p> <p><u>45'-48' SILTY SANDY GRAVEL</u></p> <p><u>48'-70' SLIGHTLY SILTY SAND</u></p> <p><u>70'-140' SAND</u></p>	

APR 16 2001



WELL SUMMARY SHEET

Page 2 of 2
Date: 2/5/01

Well ID: <u>C 3123</u>	Well Name: <u>299-W22-81</u>
Location: <u>East Side 241-S Tank Farm / 200W</u>	Project: <u>RCRA CY 2001</u>
Prepared By: <u>L. D. Walker</u>	Date: <u>2/5/01</u>
Reviewed By: <u>DC Weekes</u>	Date: <u>2/5/01</u>
Signature: <u>[Signature]</u>	Signature: <u>[Signature]</u>

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
Bentonite pellets, 3/8" 209.9' → 216.7'		150		140' → 163': Silty SAND
Silica sand, 10-20 mesh 216.7' → 270'		175		163' → 174': Silty Sandy GRAVEL
Well Screen: 4-in ID, 0.020-in slot cont. wire wrap, SS type 304: 226.75' → 261.72'		200		174' → 178': Silty SAND
Sump: 4-in ID SS 304 261.72' → 263.72'		225		178' → 259': Silty Sandy GRAVEL
Total 4-in ID SS material is 263.72' (+2' → 263.72')		250		WL = 225.5' 1/29/01 259' → 270': Sandy GRAVEL
All depths in feet below ground surface All temp. casing removed from the ground.		275		TD = 270'



0532884

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable Tool	Sample Method: Grab/Spilt Spoon	WELL NUMBER: 299-W22-82	TEMPORARY WELL NO: Not Allowed
Drilling Fluid Used: none	Additives Used: water	Coordinates: N	Not documented
Driller's Name: M. Wraaplr	WA State Lic Nr: 1909	Coordinates: E	Not documented
Drilling Company: RSI	Company Location: Woodland, Ca.	Start Card #:	Not Available
Date Started: 26Jan01	Date Completed: 23Feb01	Elevation Ground Surface:	

Depth to Water: 226.27 ft 23Feb01
(Ground surface)

Elevation of Reference Point: m

GENERALIZED STRATIGRAPHY Geologist's Log

Height of Reference Point Above Ground Surface:

Depth of Surface Seal: 10ft.
Type of Surface Seal: 4x4 Concrete Pad

0 - 0.5 ft : Sandy GRAVEL
0.52 - 9 ft : Slightly Silty SAND
9 - 16 ft : Gravelly SAND
16 - 51 ft : SAND

51 - 58 ft : Gravelly SAND
58 - 111 ft : SAND

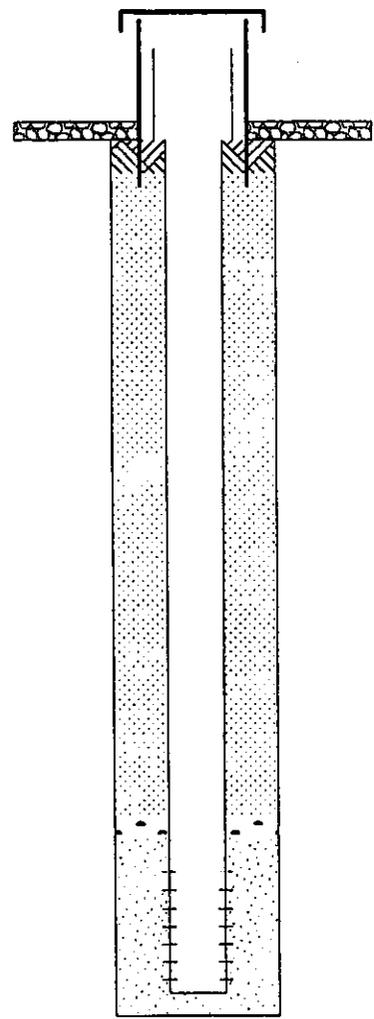
111 - 112 ft : SILT
112 - 138 ft : Silty SAND

138 - 147 ft : Gravelly Silty SAND
147 - 163 ft : Silty Sandy GRAVEL

163 - 175 ft : Silty SAND

175 - 179.5 ft : Slightly Silty SAND
179.5 - 190.5 ft : Silty Sandy GRAVEL

190.5 - 194 ft : Silty SAND
194 - 270 ft : Silty Sandy GRAVEL



Fill	Casing	Screen
0 - 10 ft : 11-inch hole Cement Surface Seal	0 - 226.1 ft : 4 inch 4" 304 SS sch 5 csg.	
10 - 209.4 ft : 11-inch hole Granular Bentonite		
209.4 - 215.7 ft : 11-inch hole Bentonite Pellets		
215.7 - 263.2 ft : 11-inch hole 10/20 Silica Sand		226.1 - 261.2 ft : 4 inch 4" 304 SS .020 slot scrn
263.2 - 270 ft : 11-inch hole 10/20 Silica Sand	261.2 - 263.2 ft : 4 inch 4" SS Sump	

270 ft : Borehole drilled depth

0 - 270 ft : 11-in. 10-3/4" Cs Temp.csg. set w/cable tool

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 16Apr01
Print Date: 16Apr01



WELL CONSTRUCTION SUMMARY REPORT

0534116

Start Date: 1-26-01
 Finish Date: 02/23/01
 Page 1 of 1

Specification No.: 0200 W SP. 50007 Rev. No.: 0 Well Name: 299-W22-82 Temp. Well No.: C3124
 ECNs: N/A Approximate Location: 200m SE of 241-SX Tank Farm/200W
 Project: RCRA Drilling CY2001 Other Companies: BHI, CHI
 Drilling Company: Resant Sonic Int. Geologist(s): L. Walker, G.S. Thomas, m Faurot, D. Weekes, C. Trice
 Driller: M. Wraspir

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD/HOLE DIAMETER	
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter From ___ to ___
FJ Carbon Steel	0 - 270'	11" / 9 1/4"	Cable Tool: 10 3/4" / 9 1/4"	Diameter From 0 to 270'
10 3/4" / 9 1/4"	- 270' - 270'		Air Rotary:	Diameter From ___ to ___
			A.R. w/Sonic:	Diameter From ___ to ___
				Diameter From ___ to ___
				Diameter From ___ to ___

*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design

Drilling Fluid: N/A

Total Drilled Depth: 270' Hole Dia @ TD: 11.0"
 Well Straightness Test Results: Passed Static Water Level: 226.27' Date: 02/23/01

GEOPHYSICAL LOGGING				
Sondes (type)	Interval	Date	Sondes (type)	Interval
SPECTRAL Gamma	0' - 269'	2/13/01		
Neutron	0' - 224'	2/13/01		

COMPLETED WELL							
Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	Volume	Mesh Size
4" ID Total 55304		FJ	N/A	Colorado Silica Sand	215.7' - 263.1'	63 bags	10-20
4" ID Sump 55304	263.2' - 263.2'	FJ	N/A	Bentonite pellets	209.4' - 215.2'	8 bags	1/4"
4" ID Screen 55304	224.1' - 263.2'	FJ	0.020"	Granular Bentonite	10.0' - 209.4'	204 bags	1/8"
4" ID casing 55304	120' - 224.1'	FJ	N/A	Portland Cement	0' - 10.0'	13 bags	N/A
				Bentonite Powder	NA	~1 bag	N/A

OTHER ACTIVITIES

Aquifer Test: Date: Well Abandoned: Yes: No: Date:
 Description: Description:

WELL SURVEY DATA

Date: Protective Casing Elevation:
 Washington State Plane Coordinates: Brass Cap Elevation:

COMMENTS/REMARKS

Vol. Calc: 10-20 Silica Sand; 0.53 ^{ft³} * 63 bags = 33.39 ft³; bentonite pellets; 0.62 ^{ft³} bag * 9 bag = 5.58 ft³; bentonite crumbles; 0.71 ^{ft³} bag * 195 bags = 138.45 ft³; Portland Cement; 1.285 ^{ft³} bag * 13 bags = 16.71 ^{ft³}

Reported By: Charlene Martinez Date: 03/08/01 Title: Geologist Signature: Charlene Martinez
 Reported By: DC Weekes Date: 4/11/01 Title: Geologist Signature: DC Weekes



WELL SUMMARY SHEET

Page 1 of 2
Date: 2/23/01

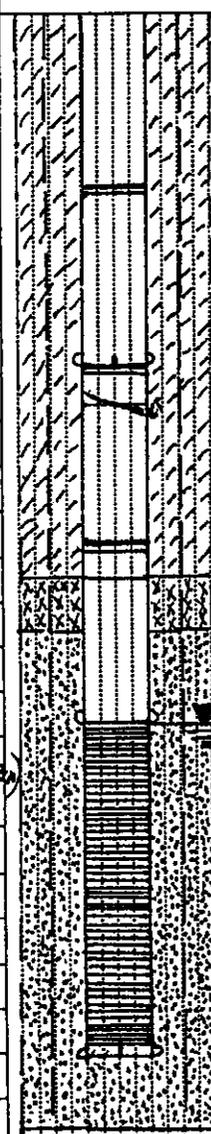
Well ID: <u>C 3124</u>	Well Name: <u>299-W22-82</u>
Location: <u>East of 241-SX Tank Farm</u>	Project: <u>RCRA FY01 Drilling</u>
Prepared By: <u>L.D. Walker / CTRICE</u> Date: <u>2/20/01</u>	Reviewed By: <u>DC Wickes</u> Date: <u>2/28/01</u>
Signature: <u>L.D. Walker / CTRICE</u>	Signature: <u>DC Wickes</u>

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
<p>6" dia Protective casing 1.0' above the 4" casing</p> <p>4.5' OD / 4" ID WELL CASING</p> <p>SS TYPE <u>304</u></p> <p>+2.0' → <u>267.86 CT</u></p> <p><u>267.4' - 268.1' JON</u></p> <p>PORTLAND CEMENT GROUT</p> <p>0' - 10'</p> <p>Granular Bentonite</p> <p>10' → 209.4'</p> <p>Temporary casing a <u>10 3/4" / 9 1/4" set at 5'</u></p> <p>All depths in feet below ground surface.</p> <p>All temp casing removed from ground</p>		<p>0</p> <p>25</p> <p>50</p> <p>75</p> <p>100</p> <p>125</p>	<p>0' → 0.5' : Sandy GRAVEL</p> <p>0.5' → 9' : Slightly Silty SAND</p> <p>9' → 16' : Gravelly SAND</p> <p>16' → 51' : SAND</p> <p>51' → 58' : Gravelly SAND</p> <p>58' → 111' : SAND</p> <p>111' → 112' : SILT</p> <p>112' → 138' : Silty SAND</p> <p>138' → 147' : Gravelly Silty SAND</p>	



WELL SUMMARY SHEET

Well ID: <u>C 3124</u>	Well Name: <u>299-W22-82</u>
Location: <u>SE of 241-SX Tank Farm/200W</u>	Project: <u>RCRA FY01 Drilling</u>
Prepared By: <u>L.D. Walker / CTRICE</u>	Date: <u>2/28/01</u>
Signature: <u>[Signature]</u>	Reviewed By: <u>DC Weekes</u>
	Date: <u>2/28/01</u>
	Signature: <u>[Signature]</u>

CONSTRUCTION DATA		GEOLOGIC/HYDROLOGIC DATA				
Description	Diagram	Depth in Feet	Graphic Log	Lithologic Description		
		150		147' → 163': Silty Sandy GRAVEL		
Dentonite Pellets 209.4' → 215.7'					163' → 175': Silty SAND	
Silica Sand, 10-20 mesh, 215.7' → 226.1'				175		175' → 179.5': Slightly Silty SAND
Well Screen, 4" ID, 0.020- -1/2 slot continuous wire- wrap, SS type 304 225.9' → 226.1'						179.5' → 190.5': Silty Sandy GRAVEL
Sump, 4" ID SS type 304, 226.2' → 226.7'				200		190.5' → 194': Silty SAND
						194' → 270': Silty Sandy GRAVEL
				225		
Total SS 4" ID material (inc. screen) is 220' ^{225.8'} → 227.0' ^{226.7'} (226.8' to 227.0') →						
				250		
				275		
All depths in feet below ground surface All temp casing removed from ground				T.D. = 270' Water level 226.27' 2/23/01		



WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable Tool	Sample Method: Grab/Split Spoon	WELL NUMBER: 299-W22-83	TEMPORARY WELL NO: Not Allowed
Drilling Fluid Used: none	Additives Used: water	Coordinates: N	Not documented
Driller's Name: Gary Howell	WA State Lic Nr: Not Available	Coordinates: E	Not documented
Drilling Company: RSI	Company Location: Woodland, Ca.	Start Card #:	Not Available
Date Started: 22Feb01	Date Completed: 14Mar01	Elevation Ground Surface:	

Depth to Water: 227.05 ft 14Mar01
(Ground surface)

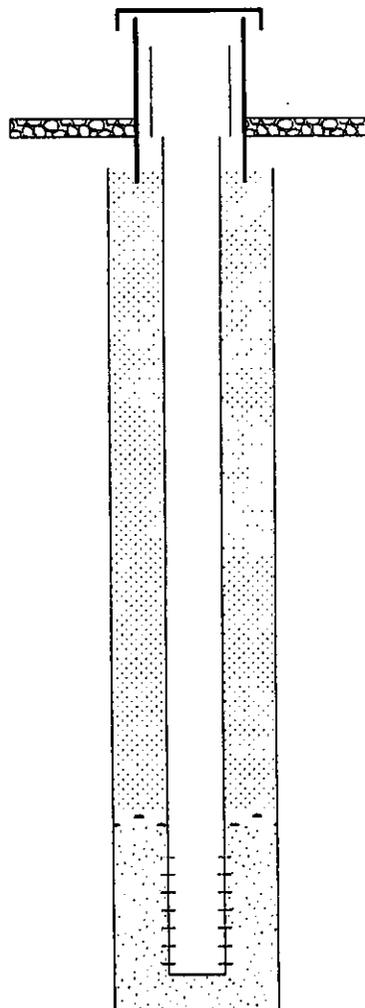
Elevation of Reference Point: m

GENERALIZED STRATIGRAPHY Geologist's Log

Height of Reference Point Above Ground Surface:

Depth of Surface Seal: 10 ft
Type of Surface Seal: 4x4 Concrete Pad

0 - 0.5 ft : Gravel Basalt Rich
 0.5 - 12 ft : Sandy gravel
 12 - 19 ft : Sand trace of Gravel
 19 - 30.5 ft : Sand trace of Gravel
 30.5 - 32 ft : Gravelly Sand (silt stringer at 32 ft)
 32.5 - 45 ft : Sand
 46 - 51.5 ft : Silty Sand
 51.5 - 57.5 ft : Cobble Gravel
 57.5 - 65.5 ft : Gravelly Sand
 65.5 - 72 ft : Sand
 72 - 128 ft : Slightly Silty Sand
 129 - 134 ft : Sand
 134 - 137 ft : Sandy Silt
 137 - 141 ft : Sand with caliche
 141 - 145 ft : Sandy Silt trace of gravel
 146 - 170 ft : Sandy Gravelly Silt
 170 - 175 ft : Sand
 175 - 185 ft : Silty Sand
 185 - 195 ft : Sandy Gravelly Silt
 195 - 236 ft : Silty Sandy Gravel - 232/234 Split Spoon sandy gravel w/cobbles.



Fill	Casing	Screen
	0 - 226.3 ft : 4 Inch 4" 304 SS sch 5 csg	
10 - 211.3 ft : 11-inch hole Granular Bentonite		
211.3 - 216.3 ft : 11-inch hole 1/4" Bentonite Pellets		226.3 - 261.3 ft : 4 Inch 4" 304 SS Wirewrap .020 slot scrn
216.3 - 263.3 ft : 11-inch hole 10/20 Silica Sand		
263.3 - 275 ft : 11-inch hole 10/20 Silica Sand	261.3 - 263.3 ft : 4 Inch 4" SS Sump	

275 ft : Borehole drilled depth

0 - 275 ft : 11-in. 10-3/4" CS Temp. setw/ cable tool

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
 Reference: Hanford Wells
 Revision: 0
 Revision Date: 16Apr01
 Print Date: 16Apr01



WELL CONSTRUCTION SUMMARY REPORT

0534118

Start Date: 2/22/01
 Finish Date: 3/14/01
 Page 1 of 1

Classification No.: 0200W-3P 00007	Rev. No.: 0	Well Name: 279-W22-83	Temp. Well No.: C3126
-CNS: NA		Approximate Location: EAST SIDE of SX Tank Farm	
Project: 0100 RCRA Drilling		Other Companies: CHI	
Drilling Company: RSI		Geologist(s): DCWeekes, C Martinez, C Trice	
Driller: Gary Howell			

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD/HOLE DIAMETER	
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter From ___ to ___
Carbon STEEL	0 - 275'	11" / 10" CT	Cable Tool: (9")	Diameter From 0 to 275'
10 ³ / ₄ " / 10 ³ / ₈ " 9 1/2"		10 1/8" / 9 1/4"	Air Rotary:	Diameter From ___ to ___
			A.R. w/Sonic:	Diameter From ___ to ___
				Diameter From ___ to ___
				Diameter From ___ to ___

*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design

Drilling Fluid: H₂O

Total Drilled Depth: 275' Hole Dia @ TD: 9"

Total Amt. Of Water Added During Drilling: 223 gallons

Well Straightness Test Results: PASSED 3/8/01

Static Water Level: 227.05' Date: 3/14/01

GEOPHYSICAL LOGGING					
Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
SPECTRAL Gamma	0 - 275.2'	3/17/01			
Neutron					
Neutron	0' - 236'	3/17/01			

COMPLETED WELL							
Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	Volume	Mesh Size
4" ID endcap, SS304	261.3 - 263.3	F480	NA	Colorado Silica Sand	216.3 - 263.3	58 bags	10-20
4" ID screen, SS3	226.3 - 261.3	F480	0.020"	Bentonite Pellets 1/4"	211.3 - 216.3	5 buc.	1/4"
4" ID CASING,	+2.0 - 226.3	F480	NA	Bentonite Crumbles	10' - 211.3	149 bags	1/8"
				Portland Cement (Cement)	0' - 10'	8 bag	

OTHER ACTIVITIES					
Aquifer Test:	Date:	Well Abandoned:	Yes:	No:	Date:
Description:	Description:				

WELL SURVEY DATA	
Date:	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Cap Elevation:

COMMENTS/REMARKS

Vol calcs: 10-20 Silica Sand: 0.535 ft³/bag x 58 bags = 31.03 ft³; BENTONITE PELLETS 0.62 ft³/bucket x 5 buckets = 3.1 ft³; Bentonite crumbles 0.71 ft³/bag x 149 bags = 105.79 ft³; Portland Cement: 1.285 ft³/bag x 8 bags = 10.28 ft³

Reported By: CTRICE	Date: 3/14/01	Reported By: JMFaurate	Date: 4/10/01
Title: Geologist	Signature: C. Trice	Title: Geologist	Signature: JMFaurate



0534140

WELL SUMMARY SHEET		Page 1 of 3		
		Date: 02/28/01		
Well ID: C 3121		Well Name: 299-W22-83		
Location: East of SX Tank Farm		Project: RCRA F401 Drilling		
Prepared By: Charlene Martinez	Date: 02/28/01	Reviewed By: DC Weekes	Date: 4/3/01	
Signature: Charlene Martinez		Signature: DC Weekes		
CONSTRUCTION DATA		GEOLOGIC/HYDROLOGIC DATA		
Description	Diagram	Depth in Feet	Lithologic Description	
6" DIA. PROTECTIVE CASING 1.0' above the 4" casing		0'	0'-0.5' Gravel, basalt rich	
4.5' 00/4" ID WELL CASING, SS TYPE 304				A-B sand + gravel
+2.0' → 226.3'				0.5'-12' sands (s), 95% - 100%
Portland Cement Grout				gravel, 0-5%
0' → 10.0'			20'	12'-19' sands (s) or gravel (0-10%)
				19'-30.5' sand (s) 100% sand,
				trace gravel
			40'	30.5'-32' Gravelly sand
				32' silt stringer
				32.5'-45' sand (s) bn-gr.
				m-f mod sorted
				46'-51.5' coarse gr stringers of sand, thin lenses of silt
			60'	51.5'-57.5' gravel stringer @ 51.5'
				poorly sorted, large cobbles
				57.5'-65.5' Gravelly sand
			65.5'-72.0' Sand (s)	
		80'	72.0' slightly silty sand (m)s	
			83' minor silt lens detected	
		100'		
All depths in Feet below ground surface.				
All temp casing removed from ground.				



WELL SUMMARY SHEET

Page 2 of 3

Date: 03/01/01

Well ID: C 3126

Well Name: 299-w22-83

Location: East of SX Tank Farm

Project: RCRA FY01 Drilling

Prepared By: Charlene Martinez Date: 03/01/01

Reviewed By: DC Weekes Date: 4/3/01

Signature: Charlene Martinez

Signature: DC Weekes

CONSTRUCTION DATA		GEOLOGIC/HYDROLOGIC DATA		
Description	Diagram	Depth in Feet	Graphic Log	Lithologic Description
all depth in log below ground surface. All temp casing removed from ground.		120		72.0' → 128.0' slightly silty sand(s)
		129		129' very thin clayey silt @ 128'
		134		129' → 134' sand(s) (micaceous)
		140		134' → 137' sandy silt (sm) tr gravel
		141		137' → 141' calcareous (sandy silt) (sm) tr calcareous
		142		141' → 145' sandy silt (sm) tr gravel
		146		145' → 170' sandy gravelly silt (sqm)
Granular Bentonite 10.0' → 211.3'		160		
		170		170' → 175' sand (s)
		180		175' → 185' silty sand (ms)
		185		185' → 195' sandy gravelly silt (sqm)
		195		195' → 236' ^{silty} sandy gravel
		220		WATER DEPTH 227.05' by ^{3/14/01}
Bentonite PELLETS 1/4" 211.3' → 216.3'				
Silica Sand, 10-20 mesh 216.3' → 227.5'				232' - 234' ^{silty} splits poor sand gravel w/ cobbles

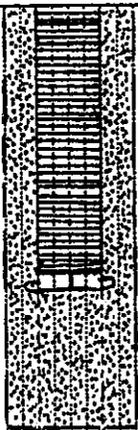


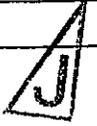
WELL SUMMARY SHEET

Page 3 of 3

Date: 03/06/01

Well ID: <u>C 3126</u>	Well Name: <u>299-W22-83</u>
Location: <u>East of SX Tank Farm</u>	Project: <u>RCRA FY01 Drilling</u>
Prepared By: <u>Charlene Martinez</u> Date: <u>03/06/01</u>	Reviewed By: <u>DC Weekes</u> Date: <u>4/3/01</u>
Signature: <u>Charlene Martinez</u>	Signature: <u>DC Weekes</u>

CONSTRUCTION DATA		GEOLOGIC/HYDROLOGIC DATA		
Description	Diagram	Depth in Feet	Graphic Log	Lithologic Description
Well SCREEN, 4" ID, 0.020- in slot continuous wire-wrap SS type 304, 226.3' → 261.3'		240		236' → ^{275'} silty sandy gravel
Sump, 4" ID SS Type 304 261.3' → 263.3'		260		247' → 249' silty sandy gravel w/ cobbles.
TOTAL SS 4" ID material is 265.30' (+2.0' → 263.3')		280		I.D. = 275'
All depths in feet below ground surface.				
All temp casing removed from ground.				



WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable Tool	Sample Method: Grab/Spill Spoon	WELL NUMBER: 299-W22-84	TEMPORARY WELL NO: Not Allowed
Drilling Fluid Used: None	Additives Used: none	Coordinates: N	Not documented
Driller's Name: Gary Howell	WA State Lic Nr: 1930	Coordinates: E	Not documented
Drilling Company: RSI	Company Location: Woodland, Ca.	Start Card #:	R037816
Date Started: 01Oct01	Date Completed: 01Nov01	Elevation Ground Surface:	

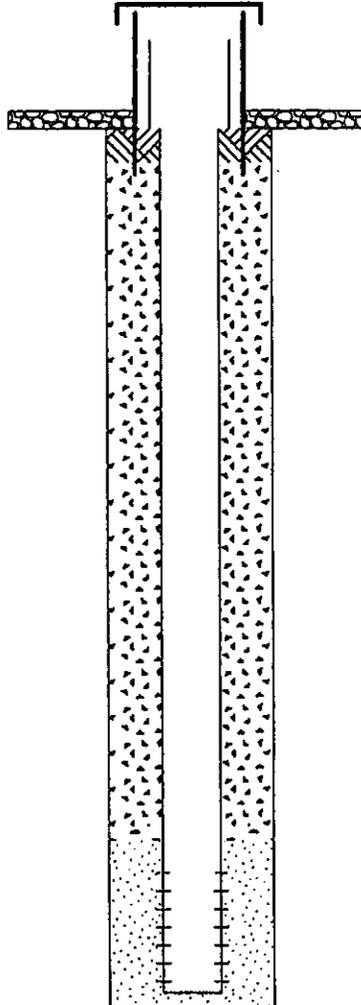
Depth to Water: 232.36 ft 02Nov01
(Ground surface)

Elevation of Reference Point: m

GENERALIZED STRATIGRAPHY Geologist's Log

Height of Reference Point Above Ground Surface:
Depth of Surface Seal: 10.3 ft
Type of Surface Seal: 4x4 Concrete Pad

0 - 10 ft : Fill Material
10 - 25.3 ft : Gravelly Sand
25.3 - 39 ft : Sand
39 - 54.8 ft : Gravelly Sand
54.8 - 60 ft : Sand
60 - 70 ft : Slightly Silty Gravelly Sand
70 - 130 ft : Silty Sand w/day lens 94 to 94.5 ft
130 - 148 ft : Sand
148 - 156 ft : Silt w/trace of sand
156 - 157 ft : Gravelly Sandy Silt
157 - 158 ft : Silty Sand
158 - 161 ft : Sand
161 - 180 ft : Silty Sand
180 - 250 ft : Silty Sandy Gravel
250 - 255 ft : Sandy Silt
255 - 265 ft : Silty Gravelly Sand
265 - 273.5 ft : Sandy Gravel



Fill	Casing	Screen
0 - 10.3 ft : 11-inch hole Cement Surface Seal	0 - 232 ft : 4 inch 304/304L SS sch 5 csg	
10.3 - 217.4 ft : 11-inch hole Bentonite Crumbles		
217.4 - 222 ft : 11-inch hole 1/4" Bentonite Pellets		
222 - 269.1 ft : 11-inch hole 10/20 Silica Sand		232 - 267 ft : 4 inch 304/304L SS Wire Wrap .020 slot scrn
269.1 - 273.5 ft : 11-inch hole 10/20 Silica Sand	267 - 269.1 ft : 4 inch 304/304L SS Sump	

273.5 ft : Borehole drilled depth

0 - 273.5 ft : 11-in. Cable Tool 10-3/4" CS Temp csg to 273.5 ft

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 13Nov01
Print Date: 13Nov01



**SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W22-84**

WELL DESIGNATION : 299-W22-84
CERCLA UNIT :
RCRA FACILITY :
DEPTH DRILLED (GS) : 273.5 ft
MEASURED DEPTH (GS) : 269.1 02Nov01
AVAILABLE LOGS : Geologist & Geophysical
DATE EVALUATED : Data not available
EVAL RECOMMENDATION : Data not available
LISTED USE : RCRA Monitoring

CURRENT USER : RCRA & Operations

PUMP TYPE : Not Documented
MAINTENANCE : Data not available
COMMENTS : Cable Tool 10-3/4" CS csg to 273.5 ft

TV SCAN COMMENTS :

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 13Nov01
Print Date: 13Nov01



0541446

WELL CONSTRUCTION SUMMARY REPORT

Start card # R037815

Start Date: 10/01/01
 Finish Date: 11/1/01
 Page 1 of 1

Specification No.: 0200X-SP-V0004 Rev. No.: 0 Well Name: 299-622-84 Temp. Well No.: C3398

ECNs: NA Approximate Location: East of 241-54 Tank Farm
 Project: C-401 RCRA Drilling Other Companies: CHZ, BHI
 Drilling Company: Resonant Sonic Inc. (RSI) Geologist(s): C. Trice, J. Hocking, C. Martinez, G. Thomas
 Driller: Gary Howell ("Howle") Lic. # 1930

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD/HOLE DIAMETER	
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter From ___ to ___
Carbon Steel (FS)	0' - 273.5'	10 5/8" / 9 3/8"	Cable Tool: X 10 3/4" O.D.	Diameter From 0' to 273.5'
			Air Rotary:	Diameter From ___ to ___
			A.R. w/Sonic:	Diameter From ___ to ___
				Diameter From ___ to ___
				Diameter From ___ to ___
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter From ___ to ___

Drilling Fluid: AIR

Total Drilled Depth: 273.5' Hole Dia @ TD: 11" Total Amt. Of Water Added During Drilling: N/A

Well Straightness Test Results: Passed 10/19/01 20.4" long 8.5" O.D. Static Water Level: 232.36' Date: 11/2/01

GEOPHYSICAL LOGGING					
Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
Spectral Gamma	134.0' - 274.0'	10/22/01			
Spectral Gamma	0' - 133.0'	10/23/01			
Neutron Moisture	0' - 236.25'	10/19/01			

COMPLETED WELL						
Size/WL/Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	*Volume Mesh Size
4" ID SS 304/304L Sump	269.1 - 267.0			Colorado Silica Sand	273.5 - 222.0	52.0 ft ³ 10-20
4" SS 304/304L SCH 80.55 4" ID CONT. WIRE WRAP SCREEN	267.0 - 232.0		0.020"	1/4" Bentonite Pellets	222.0 - 217.4	3.52 ft ³ 1/4"
4" ID SS 304/304L Riser	232.0 - 2.00			Granular Bentonite Crumbles	217.4 - 10.3	116.7 ft ³
6" ID SS Manument	0.00 - 2.00			Portland Cement	10.3 - 0	3.82 ft ³ N/A

OTHER ACTIVITIES

Aquifer Test: Drawdown/Recovery Date: 11/2/01 Well Abandoned: Yes: No: Date:

Description: Well development pumping, drawdown monitored with transducer. Description:

WELL SURVEY DATA

Date: Protective Casing Elevation:
 Washington State Plane Coordinates: Brass Cap Elevation:

COMMENTS/REMARKS

* vol. calc. => 0.5454 ft³ / (0.525 ft³/bag) = ft³ [Ex: 0.5454 ft³ / (0.525 ft³/51 bags) = 51.99 ft³]

Reported By: C. TRICE / Jess Hocking Reviewed By: DC Weekes
 Title: Geologist / Geologist Date: 10/19/01 Title: Geologist Date: 11/30/01
 Signature: C. Trice / Jess Hocking Signature: DC Weekes



WELL SUMMARY SHEET

0541445

Page 1 of 2

Date: 10/12/01

Well ID: C 3398 Well Name: 299-W22-84
 Location: East of 241-5x Tank Farm 200-W Project: CY01 RCEA Drilling
 Prepared By: Jess Hacking Date: 11/5/01 Reviewed By: DC Weekes Date: 11/6/01
 Signature: *Jess Hacking* Signature: *DC Weekes*

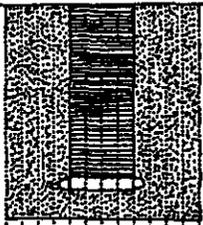
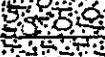
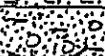
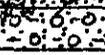
CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
6" ID SS 304 Protective casing above		0		0'-1.0' Fill material
4" ID SS 304/304L Riser [Sch 40] +2.00' → 232' <i>PCW</i>				1.0'-25.3' gravelly SAND (qS)
SS 304/304L 0.020" CONT. 4" ID Wire wrap screen [Sch 40] 232' → 267' <i>PCW</i>				25.3'-39.0' SAND (S)
4" ID SS 304/304L sump [Sch 40] 267' → -269.1' <i>PCW</i>				39.0'-54.8' gravelly SAND (qS)
Colorado ⁽¹⁰⁻²⁰⁾ Silica Sand 273.5' → 222.0'				54.8'-60.0' SAND (S)
1/4" Bentonite Pellets 222.0' → 217.4'				60.0'-70.0' slightly silty gravelly SAND
Granular Bentonite Crumbles 217.4' → 10.3'				70.0'-130.0' silty SAND (mS)
Portland Cement 10.3' → 0.00'				130.0'-143.0' SAND (S)
				143.0'-148.0' SILT (m) trace sand
				148.0'-156.0' SILT (m) trace sand
				156.0'-157.0' gravelly sandy SILT (qM)
				157.0'-158.0' silty SAND (mS)
				158.0'-161.0' SAND (S)
				161.0'-180.0' silty SAND (mS)
				180.0'-250.0' silty sandy GRAVEL (mSG)
All Temp. Casing removed from ground.				
Depths below ground surface				
NOT TO SCALE				



WELL SUMMARY SHEET

 Page 2 of 2
 Date: 10/17/01

Well ID: <u>C 3398</u>		Well Name: <u>299-W 22-84</u>	
Location: <u>East of 241-5 A Tank Farm 200 W</u>		Project: <u>CY01 RCRA DRILLING</u>	
Prepared By: <u>C. Martinez</u>	Date: <u>10/18/01</u>	Reviewed By: <u>D. Weekes</u>	Date: <u>11/6/01</u>
Signature: <u>C. Martinez</u>		Signature: <u>D. Weekes</u>	

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA		
Description	Diagram		Graphic Log	Lithologic Description	
		240			
				<u>250'-255.0' sandy SILT (sm)</u>	
				<u>255.0'-265.0' silty gravelly SAND (ms)</u>	
				<u>265.0'-273.5' sandy GRAVEL (sg)</u>	
				<u>TD @ 273.5' 10/19/01</u>	
			280		<u>Static water level at 232.36' (11/2/01)</u>

Depths below ground surface.
All Temp. Casing removed
from ground.
 NOT TO SCALE



0540438

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable Tool	Sample Method: Grab/Split Spoon	WELL NUMBER: 2799-W22-85	TEMPORARY C3399WELL NO: Not Allowed
Drilling Fluid Used: None	Additives Used: None Documented	Coordinates: N	Not documented
Driller's Name: K. Olson	WA State Lic Nr: 1217	Coordinates: E	Not documented
Drilling Company: RSI	Company Location: Woodland, Ca.	Start Card #:	R037816
Date Started: 21Sep01	Date Completed: 26Oct01	Elevation Ground Surface:	

Depth to Water: 218.42 ft 26Oct01
(Ground surface)

Elevation of Reference Point: m

GENERALIZED STRATIGRAPHY Geologist's Log

Height of Reference Point Above Ground Surface:

Depth of Surface Seal: 10.1 ft

Type of Surface Seal: 4x4 Concrete Pad

0 - 5 ft : Backfill material
 5 - 17 ft : Sand (silt lens @ 16 ft)
 17 - 25 ft : Sandy Silt
 25 - 32 ft : Sand
 32 - 45 ft : Silty Sand w/silt lens @ 35 ft

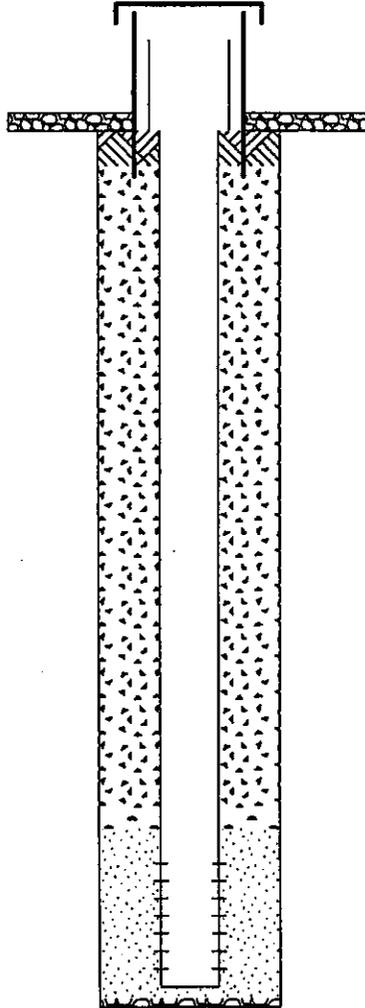
 45 - 47 ft : Sandy Gravel
 47 - 54 ft : Silty Sandy Grvel
 54 - 57 ft : Sand
 57 - 65 ft : Silty Sand w/silt lens @ 60 ft
 65 - 70 ft : Sand w/silt lens @ 66 ft.
 70 - 100 ft : Silty Sand w/silt lenses @ 85 and 88 ft.

 100 - 104 ft : Sand
 104 - 130 ft : Silty Sand

 130 - 140 ft : Silt
 140 - 143 ft : Sandy Silt
 143 - 149 ft : Silt
 149 - 151 ft : Sandy Silt
 151 - 153 ft : Silt
 153 - 155 ft : Caliche
 155 - 162 ft : Silty Sandy Gravel
 162 - 168 ft : Silty Gravelly Sand
 168 - 174 ft : Sand
 174 - 180 ft : Sandy Gravel
 180 - 235 ft : Silty Sandy Gravel

 235 - 255 ft : Gravelly Silty Sand

 255 - 260.1 ft : Silty Sandy Gravel



Fill	Casing	Screen
0 - 10.1 ft : 12-inch hole Cement Surface Seal	0 - 217.12 ft : 4 inch 304L SS sch 5 csg	
10.1 - 202.1 ft : 12-inch hole Bentonite crumbles		
202.1 - 206.8 ft : 12-inch hole 1/4" Bentonite Pellets		217.12 - 252.03 ft 4 inch 304L SS Wire Wrap .020 slot scrn
206.8 - 254.13 ft : 12-inch hole 10/20 Silica Sand		
254.13 - 257.5 ft : 12-inch hole 10/20 Silica Sand	252.03 - 254.13 ft : 4 inch 304L SS Sump	
257.5 - 260.1 ft : 12-inch hole Slough		

260.1 ft : Borehole drilled depth

0 - 260.1 ft : 12-in. Cable Tool 11-3/4" CS Temp csg

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
 Reference: Hanford Wells
 Revision: 0
 Revision Date: 08Nov01
 Print Date: 08Nov01



**SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 2399-W22-85**

WELL DESIGNATION : 2399-W22-85
CERCLA UNIT :
RCRA FACILITY :
DEPTH DRILLED (GS) : 260.1 ft
MEASURED DEPTH (GS) : 254.13 26Oct01
AVAILABLE LOGS : Geologist & Geophysical
DATE EVALUATED : Data not available
EVAL RECOMMENDATION : Data not available
LISTED USE : RCRA Monitoring

CURRENT USER : RCRA & Operations

PUMP TYPE : Not Documented
MAINTENANCE : Data not available
COMMENTS : Cable Tool 11-3/4" CS Temp csg to 260.1 ft.

TV SCAN COMMENTS :

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 08Nov01
Print Date: 08Nov01



WELL CONSTRUCTION SUMMARY REPORT

0540431

Start Date: 09/21/01

Finish Date: 10/26/01

Page 1 of 1

Specification No.: 0200X-SF- V0004	Rev. No.: 0	Well Name: 299-022-85	Temp. Well No.: C3399
ECNs: NA R037815 start card		Approximate Location: SE side of S-SX Tank Farm	
Project: C401 RCRA Drilling		Other Companies: RWE, CMT, RST	
Drilling Company: Resonant Sonic Inc.		Geologist(s): C. Martinez, D.S. Watson, J. Wilmeth, G. Thomas, C. Trice, DC Weekes	
Driller: Kelly Olson / Gary Howell ("Howie")			

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD/HOLE DIAMETER	
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter From ___ to ___
Carbon steel FS 11 3/4" / 10 3/4"	0' - 258.9'	12 1/4" / 11"	Cable Tool: 11 3/4" O.D.	Diameter From 0' to 260.1'
			Air Rotary:	Diameter From ___ to ___
			A.R. w/Sonic:	Diameter From ___ to ___
				Diameter From ___ to ___
				Diameter From ___ to ___

*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design

Bit = drive barrel w/ 9 1/4" O.D. 0-176' bgs
 Hard tool 176'-260' bgs
 Drilling Fluid: N/A

Total Drilled Depth: 260.1' Hole Dia @ TD: 12"

Well Straightness Test Results: Passed using 20.4" x 8.6" OD Static Water Level: 218.42' Date: 10/26/01

GEOPHYSICAL LOGGING					
Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
Spectral Gamma	2' - 260'	10/01/01			
Neutron Moisture	0' - 222.75'	10/01/01			

COMPLETED WELL							
Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	Volume	Mesh Size
4" ID 553044 slump	252.03' - 254.13'	F480	N/A	Colorado silica sand (50#)	202.8' - 252.5'	102.5 bags	10-20
4" ID 553044 screen	217.12' - 252.03'	"	0.020"	Bentonite pellets (50#)	202.1' - 206.8'	5 buckets	1/4"
4" ID 553044 casing	12.00' - 217.12'	"	N/A	Bentonite crumbles (50#)	10.1' - 202.1'	195 bags	N/A
				Portland cement (94#)	0' - 10.1'	95 bags	N/A

OTHER ACTIVITIES				
Aquifer Test: well development	Date: 10/26/01	Well Abandoned:	Yes:	No:
Description: used 3HP submersible pump w/ intake strainer		Description:		
200.53 bgs. withdrew H2O for 57 min. @ 30 gpm + draw				
portion of 11.583' 2nd test 18 min. withdrawal @ 11.514' 30 gpm				

WELL SURVEY DATA	
Date:	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Cap Elevation:

COMMENTS/REMARKS

val. calc: silica sand, 102.5 bags @ 0.535' ^{ft}/bag = 54.24 ft³; bent. pellets, 5 buckets @ 0.62' ^{ft}/bucket = 3.1 ft³; bent. crumbles, 195 bags @ 0.71' ^{ft}/bag = 138.45 ft³; portland cement 95 bags @ 1.285' ^{ft}/bag = 12.21 ft³

Reported By: Charlene Martinez	Reviewed By: Jess Hocking
Title: Geologist	Date: 10/26/01
Signature: Charlene Martinez	Signature: Jess Hocking
	Date: 11/5/01



WELL SUMMARY SHEET

0540424

Page 1 of 2

Date: 09/27/01

Well ID: C 3399

Well Name: 299-022-85

Location: SE side of S-SX Tank Farm 200W

Project: C401 RCRA Drilling

Prepared By: C. Martinez

Date: 09/27/01

Reviewed By: Jess Hocking

Date: 11/5/01

Signature: C. Martinez

10122/01

Signature: Jess Hocking

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
6" ID dia. protective casing set 1.00' above stainless casing		0	0-5' Backfill material	0-5' Backfill material
4" ID 553046 casing: 12.00' → 217.12'		5	5-17' sand (s) (silt lens @ 16')	5-17' sand (s) (silt lens @ 16')
Portland Cement grout: 0' → 10.1'		10	17-26' sandy SILT (sm)	17-26' sandy SILT (sm)
Bentonite crumbles: 10.1' → 202.1'		15	26-30' SAND (s)	26-30' SAND (s)
1/4" Bentonite pellets: 202.1' → 206.8'		20	30-33' silty SAND (ms) (silt lens @ 33')	30-33' silty SAND (ms) (silt lens @ 33')
4" ID 553046 0.020-in. slot 0.007-in. wire-wrap wellscreen: 217.12' → 252.03'		25	33-45' silty SAND (ms) (silt lens @ 33')	33-45' silty SAND (ms) (silt lens @ 33')
10-20 mesh silica sand: 206.8' → 257.5'		30	45-47' sandy GRAVEL (sg)	45-47' sandy GRAVEL (sg)
4" ID 553046 tailpipe: 252.03' → 254.13'		35	47-54' silty sandy GRAVEL (msG)	47-54' silty sandy GRAVEL (msG)
muddy backfill: 257.5' → 260.1'		40	54-57' SAND (s)	54-57' SAND (s)
All temporary casing removed:		45	57-65' silty SAND (s) (silt lens @ 60')	57-65' silty SAND (s) (silt lens @ 60')
All depths are in feet below ground surface.		50	65-70' SAND (s) (silt lens @ 65')	65-70' SAND (s) (silt lens @ 65')
		55	70-75' silty SAND (s) (silt lens @ 76')	70-75' silty SAND (s) (silt lens @ 76')
		60	75-100' SAND (s)	75-100' SAND (s)
		65	100-104' SAND (s)	100-104' SAND (s)
		70	104-130' silty SAND (ms)	104-130' silty SAND (ms)
		75	130-140' SILT (m)	130-140' SILT (m)
		80	140-143' sandy SILT (sm)	140-143' sandy SILT (sm)
		85	143-149' SILT (m)	143-149' SILT (m)
		90	149-151' sandy SILT (sm)	149-151' sandy SILT (sm)
		95	151-153' SILT (m)	151-153' SILT (m)
	100	153-155' CALICHE	153-155' CALICHE	
	105	155-162' silty sandy GRAVEL (msG)	155-162' silty sandy GRAVEL (msG)	
	110	162-168' silty gravelly SAND (msG)	162-168' silty gravelly SAND (msG)	
	115	168-174' SAND (s)	168-174' SAND (s)	
	120	174-180' sandy GRAVEL (sg)	174-180' sandy GRAVEL (sg)	
	125	180-235' silty sandy GRAVEL (msG)	180-235' silty sandy GRAVEL (msG)	



WELL SUMMARY SHEET

Page 2 of 2

Date: 10/08/01

Well ID: C 3399

Well Name: 299-W22-85

Location: SE Side of S-SX Tank Farm 200 W

Project: CY01 RCRA Drilling

Prepared By: C. Martinez

Date: 10/08/01

Reviewed By: Jess Hocking

Date: 11/5/01

Signature: C. Martinez

Signature: Jess Hocking

CONSTRUCTION DATA

GEOLOGIC/HYDROLOGIC DATA

Description	Diagram	Depth In Feet	Graphic Log	Lithologic Description
		240		235' - 255' gravelly silty SAND (gms)
				255' - 260' silty sandy GRAVEL (ms)
		280		TD = 260.1' bgs static water level = 218.42' bgs (10/26/01)
		320		
All temporary casing removed:				
All depths are in feet below ground surface.				



0526561

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Air Rotary Csg. Hammer	Sample Method: Grab/Split Spoon	WELL NUMBER: 299-W23-20	TEMPORARY WELL NO: C3112	Not Allowed
Drilling Fluid Used: Air	Additives Used: None	Coordinates: N	Not documented	
Driller's Name: M. Wraspir	WA State Lic Nr: 1909	Coordinates: E	Not documented	
Drilling Company: RSI	Company Location: Woodland, Ca.	Start Card #:	R043398	
Date Started: 27Jul00	Date Completed: 21Aug00	Elevation Ground Surface:		

Depth to Water: 214.29 ft ft 15Aug00
(Ground surface)

Elevation of Reference Point: m

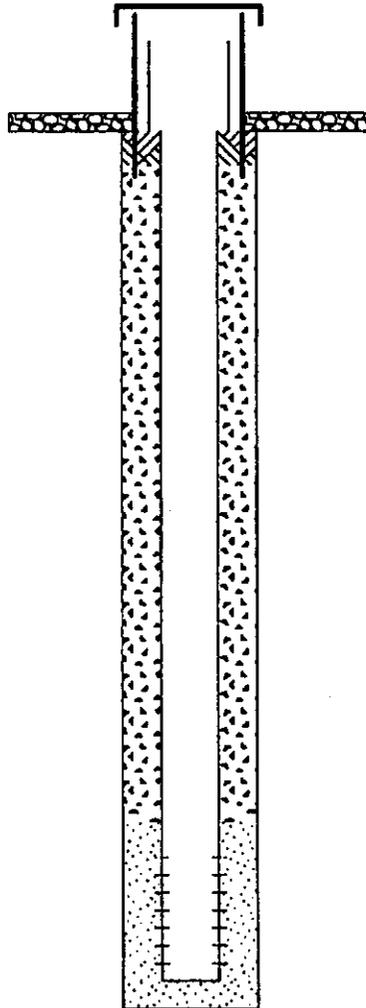
GENERALIZED STRATIGRAPHY Geologist's Log

Height of Reference Point Above Ground Surface:

Depth of Surface Seal:

Type of Surface Seal: 4x4 Concrete Pad

0 - 6 ft : Silty Sandy GRAVEL
 6 - 19 ft : Sandy GRAVEL
 19 - 34 ft : Gravelly SAND
 34 - 36 ft : Sandy GRAVEL
 36 - 55 ft : SAND
 55 - 83 ft : SAND
 83 - 87 ft : Gravelly SAND
 87 - 94 ft : SAND
 94 - 102 ft : Gravelly SAND
 102 - 117 ft : SAND
 117 - 139 ft : Slightly Silty SAND
 139 - 148 ft : No Returns
 148 - 153 ft : Silty SAND
 153 - 157 ft : Silty Sandy GRAVEL (w/caliche)
 157 - 169 ft : No Returns
 169 - 184 ft : Silty Sandy GRAVEL
 184 - 220 ft : Sandy GRAVEL
 220 - 260.5 ft : Sandy GRAVEL



Fill	Casing	Screen
0 - 10 ft : 9-inch hole Cement Surface Seal	0 - 215.5 ft : 4 inch 4" 304L SS Sch 5 csg.	
10 - 200.1 ft : 9-inch hole Bentonite Crumbles		
200.1 - 205 ft : 9-inch hole Bentonite Pellets		215.5 - 250.5 ft : 4 inch 4" SS Wire Wrap .020 slot scrn.
205 - 252.5 ft : 9-inch hole 10/20 Silica Sand		
252.5 - 260.5 ft : 9-inch hole 10/20 Silica Sand	250.5 - 252.5 ft : 4 inch 4" SS Sump	

260 ft : Borehole drilled depth

0 - 206.5 ft : 9-in. 8-5/8" CS csg. set with Air Rotary csg hammer

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
 Reference: Hanford Wells
 Revision: 0
 Revision Date: 22Sep00
 Print Date: 22Sep00



**SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W23-20**

WELL DESIGNATION : 299-W23-20
CERCLA UNIT :
RCRA FACILITY :
DEPTH DRILLED (GS) : 260.0 ft
MEASURED DEPTH (GS) : 260.5 15Aug00
AVAILABLE LOGS : Geologist
DATE EVALUATED : Data not available
EVAL RECOMMENDATION : Data not available
LISTED USE : RCRA monitoring/sampling

CURRENT USER : RCRA & Operations

PUMP TYPE : Hydrostar
MAINTENANCE : Data not available
COMMENTS : 8-5/8" CS Temp. csg set w/Air Rotary Csg. Hammer

TV SCAN COMMENTS :

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
Reference: Hanford Wells
Revision: 0
Revision Date: 22Sep00
Print Date: 22Sep00



WELL CONSTRUCTION SUMMARY REPORT

0520504

Start Date: 7-27-00

Finish Date: 8/21/00

Page 1 of 1

Specification No.:	Rev. No.:	Well Name: 299-W23-20	Temp. Well No.: C3112
ECNs:		Approximate Location: W. Fence 241-S Tank Farm/200W	
Project: CY2000 RCRA Drilling		Other Companies: Resow BHI, CHI	
Drilling Company: Resonant Sonic International		Geologist(s): L.D. Walker, JKMURRAY	
Driller: Kelly Cowden, MOWBRAR			

*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter From _____ to _____
FT 8 7/8" CS	0 - 260	8 7/8" / 7 7/8"	Cable Tool:	Diameter From _____ to _____
			Air Rotary: 8 5/8"	Diameter From 0' to 260'
			A.R. w/Sonic:	Diameter From _____ to _____
				Diameter From _____ to _____
				Diameter From _____ to _____

*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design

Drilling Fluid: _____

Total Drilled Depth: 260' Hole Dia @ TD: 8 5/8" Total Amt. Of Water Added During Drilling: _____

Well Straightness Test Results: STRAIGHT Static Water Level: 214.45 Date: 8/10/00

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	Volume	Mesh Size
SS304L CASING 4" ID	+2' - 215.5		NA	Colorado Silica SAND	205' - 260.5'	96 bags	10-20
SS304L SCREEN	215.5 - 250.5		0.020	BENTONITE PELLETS	200.1' - 205'	3 buckets	3/4"
SS316L SUMP	250.5 - 252.5		NA	BENTONITE CRUMBLES	10' - 200.1'	90 bags	
				PORTLAND CEMENT GROUT	0 - 10'	10 bags	NA
				2-PREMIUM GEL	0 - 10'	1/2 bag	NA

OTHER ACTIVITIES

Aquifer Test: WELL DEVELOPMENT Date: 8/21/00 Well Abandoned: Yes: No: Date: _____

Description: MONITOR DRAWDOWN AND RECOVERY Description: _____

WELL SURVEY DATA

Date: _____ Protective Casing Elevation: _____

Washington State Plane Coordinates: _____ Brass Cap Elevation: _____

COMMENTS/REMARKS

Vol. Calcs: 10-20 silica sand - 0.54 ft³/50lb-bag x 96 bags = 51.84 ft³; Bentonite pellets - 0.62 ft³/bucket x 3 buckets = 1.86 ft³; Granular bentonite - 0.73 ft³/bag x 90 bags = 65.70 ft³

Reported By: JILL MURRAY Reviewed By: J. Austen / J. Austen

Title: GEOLOGIST Date: 9/12/00 Title: Sr. Drilling Engr. Date: 9/21/00

Signature: Jill K. Murray Signature: J. Austen

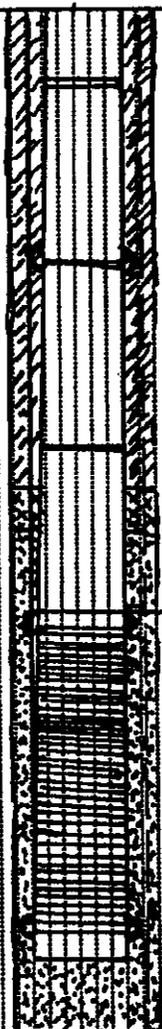
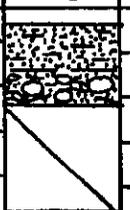
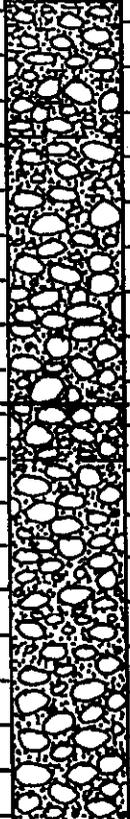
WELL SUMMARY SHEET		Page <u>1</u> of <u>2</u>		
		Date: <u>8/18/00</u>		
Well ID: <u>C3112</u>	Well Name: <u>299-W23-20</u>			
Location: <u>W. Fence of 241-S Tank Farm/200 W</u>	Project: <u>CY 2000 RCRA Drilling</u>			
Prepared By: <u>L.D. Walker JK MURRAY</u>	Date: <u>8/15/00</u>	Reviewed By: <u>DC Weekes</u>	Date: <u>8/25/00</u>	
Signature: <u>[Signature]</u>		Signature: <u>[Signature]</u>		
CONSTRUCTION DATA		GEOLOGIC/HYDROLOGIC DATA		
Description	Diagram	Depth in Feet	Lithologic Description	
		0	0' → 6': Silty Sandy GRAVEL	
0'-10' PORTLAND CEMENT TYPE I+II GROUT		6'	6' → 19': Sandy GRAVEL	
STAINLESS STEEL CASING 304L +2' → 215.5' 4" ID, 4.5" OD		25'	19' → 34': Gravelly SAND	
10' - 200.1' BENTONITE CRUMBLES		34'	34' → 36': Sandy GRAVEL	
PERMANENT OUTER CASING EMPLACED WITH A 3' STICKUP		50'	36' → 55': SAND	
TEMP. CASING 8 5/8" OD, 7 5/8" ID		75'	55' → 83': SAND	
		83'	83' → 87': Gravelly SAND	
		87'	87' → 94': SAND	
		100'	94' → 102': Gravelly SAND	
		102'	102' → 117': SAND	
		125'	117' → 139': Slightly Silty SAND	
		139'	139' → 148': No Returns	
All depths below ground surface All temp. casing removed.				

WELL SUMMARY SHEET

Page 2 of 2

Date: 8/15/00

Well ID: <u>C 3112</u>	Well Name: <u>299-W23-20</u>
Location: <u>W. Fence of 241-S Tank Farm/200 W</u>	Project: <u>CY 2000 RCRA Drilling</u>
Prepared By: <u>L.D. Walker JK MUMFORD</u> Date: <u>8/15/00</u>	Reviewed By: <u>DC Ukekes</u> Date: <u>8/25/00</u>
Signature: <u>L.D. Walker</u>	Signature: <u>DC Ukekes</u>

CONSTRUCTION DATA		GEOLOGIC/HYDROLOGIC DATA			
Description	Diagram	Depth in Feet	Graphic Log	Lithologic Description	
		150		148' → 153': Silty SAND	
				153' → 157': Silty Sandy (w/caliche) GRAVEL	
				157' → 169': No Returns	
			175		169' → 184': Silty Sandy GRAVEL
					184' → 220': Sandy GRAVEL
			200		
<u>927195 = 200.1 - 205'</u> <u>BENTONITE PELLETS</u>					
<u>SCREEN 215.5' - 250.5'</u> <u>304L SS 0.020 in slot</u> <u>Cont. Wirewrap, 4" ID, 4.5" OD</u>			225		214.29 DTW 8/15/00
<u>SANDPACK: 205' - 260.5'</u> <u>SILICA, 10-20 MESH</u>					220' → 260.5': Sandy GRAVEL
<u>250.5 - 252.5 SUMP</u> <u>316L SS 4" ID, 4.5" OD</u>			250		
		275		TD = 260.5'	

All depths below ground surf.
All temp. casing removed.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable Tool	Sample Method: Grab/Split Spoon	WELL NUMBER: 299-W23-21	TEMPORARY WELL NO: Not Allowed
Drilling Fluid Used: none	Additives Used: None	Coordinates: N	Not documented
Driller's Name: M. Wraspir	WA State Lic Nr: 1909	Coordinates: E	Not documented
Drilling Company: RSI	Company Location: Woodland, Ca.	Start Card #:	Not Available
Date Started: 26Sep00	Date Completed: 07Nov00	Elevation Ground Surface:	

Depth to Water: 212.88 ft 03Nov00
 (Ground surface)

Elevation of Reference Point: m

Height of Reference Point Above Ground Surface:

Depth of Surface Seal: 10.1 ft.

Type of Surface Seal: 4x4 Concrete Pad

GENERALIZED STRATIGRAPHY Geologist's Log

0 - 0.5 ft : Gravel
 0.5 - 8.5 ft : Sand
 8.5 - 20 ft : Sand to Slightly Silty Sand
 20 - 36.8 ft : Sandy GRAVEL

36.8 - 38.5 ft : Silty SAND
 38.5 - 40 ft : Slightly Gravelly SAND
 40 - 80 ft : SAND

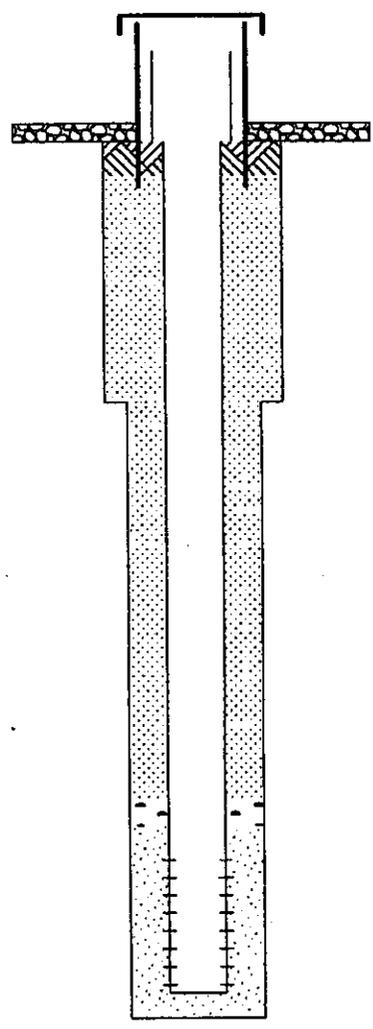
80 - 83 ft : Gravelly SAND
 83 - 88 ft : Silty SAND
 88 - 99 ft : Gravelly SAND
 99 - 120.5 ft : SAND

120.5 - 130.5 ft : Silty SAND
 130.5 - 131.5 ft : Sandy SILT
 131.5 - 139 ft : Silty SAND
 139 - 141.5 ft : Slightly Silty SAND
 141.5 - 143.5 ft : Silty SAND
 143.5 - 147 ft : Slightly Silty SAND
 147 - 153 ft : Sandy Silt
 153 - 158 ft : Slightly Silty Gravelly SAND
 158 - 168 ft : SAND
 168 - 189 ft : Sandy GRAVEL

189 - 193 ft : Slightly Silty Gravelly SAND
 193 - 197.5 ft : Gravelly Silty SAND
 197.5 - 204 ft : Gravelly Sandy SILT
 204 - 214 ft : Silty Sandy GRAVEL
 214 - 219 ft : Gravelly Sandy SILT
 219 - 240 ft : Silty Sandy GRAVEL

240 - 255 ft : Sandy GRAVEL

255 - 259 ft : Gravelly Silty SAND



Fill	Casing	Screen
0 - 10.1 ft : 12-inch hole Cement Surface Seal	0 - 212.58 ft : 4 inch 4" 304L SS csg	
10.1 - 76.41 ft : 12-inch hole Granular Bentonite		
76.41 - 193.7 ft : 9-inch hole Granular Bentonite		
193.7 - 202 ft : 9-inch hole Bentonite pellets		212.58 - 249.69 ft : 4 inch 4" 304 SS Wire Wrap .020 slot scm.
202 - 251.87 ft : 9-inch hole 10/20 Silica Sand		
251.87 - 259 ft : 9-inch hole 10/20 Silica Sand	249.69 - 251.87 ft : 4 inch 4" SS Sump	

259 ft : Borehole drilled depth

0 - 76.41 ft : 12-in. 11-3/4" CS Temp
 csg set w/Cable Tool
 76.41 - 2529 ft : 9-in. 8-5/8" CS Temp
 csg set w/Cable Tool

Report Form: WELLS Project File: WELLS.GPJ

Drawing By: JEA
 Reference: Hanford Wells
 Revision: 0
 Revision Date: 20Mar01
 Print Date: 20Mar01



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WELL CONSTRUCTION SUMMARY REPORT				Start Date: 9/26/00			
				Finish Date: 11/7/00			
				Page 1 of 1			
Specification No.: 0200W-3P C.0007		Rev. No.: 0		Well Name: 299-W23-21			
ECNs: NA		Approximate Location: West side of 241st Tank Farm					
Project: RCRA FY 2000 Drilling		Other Companies: BHI & CHI					
Drilling Company: Resonant Sonic International		Geologist(s): J.M. Faurote & G.S. Thomas					
Driller: Mo Wraspie							
TEMPORARY CASING AND DRILL PIPE			DRILLING METHOD/TOOLS/LOGS				
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter From _____ to _____			
1 3/4" OD Carbon Steel	0 - 76.41		Cable Tool:	Diameter From 55 to 259'			
8 5/8" OD Carbon Steel	0 - 253.5	9" / 7 3/8"	Air Rotary:	Diameter From _____ to _____			
			A.R. w/Sonic:	Diameter From _____ to _____			
				Diameter From _____ to _____			
				Diameter From _____ to _____			
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter From _____ to _____			
Thread design casing							
			Drilling Fluid: H ₂ O				
Total Drilled Depth: 259'	Hole Dia @ TD: 8.5"	Total Amt. Of Water Added During Drilling: 500 gallons					
Well Straightness Test Results: 20.2' L X 2 1/2" OD Tapered Bottom		Static Water Level: 212.88		Date: 11/3/00			
GEOPHYSICAL LOGGING							
Sondes (type)	Interval	Date	Sondes (type)	Interval	Date		
Spectral gamma	0' - 257'	10/31/00 (G.S.)					
RLS Neutron-Neutron	0' - 213'	10/31/00 (G.S.)					
COMPLETED WELL							
Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annual Seal/Filter Pack	Volume	Mesh Size
55 304 L Casing 4" ID	72.10 - 212.58	NA	NA	Colorado Silica Sand	202.0 - 257.5	36.5 bags	10-20
55 304 L Screen 4" ID	212.58 - 241.69		2.020	Bentonite Pellets	192.7 - 202.0	4 buckets	
55 316 L Sump 4" ID	249.69 - 257.87		NA	Bentonite Crumbles	10.1 - 192.7	182 bags	
				Portland Cement Grout	62 - 10.1	10 bags	
OTHER ACTIVITIES							
Aquifer Test:		Date:		Well Abandoned:		Yes: No: Date:	
Description:				Description:			
WELL SURVEY DATA							
Date:				Protective Casing Elevation:			
Washington State Plane Coordinates:				Brass Cap Elevation:			
COMMENTS/REMARKS							
Vol/Calcs: 10-20 silica sand - 0.54 ft ³ /50lb bag X 36.5 bags = 19.71 ft ³ . Bentonite Pellets - 0.62 ft ³ /bucket X 4 buckets = 2.48 ft ³ . Granular Bentonite - 0.73 ft ³ /bag X 132 bags = 96.36 ft ³							
Reported By: G.S. Thomas / DCWeekes				Reported By: J. AUTEN			
Title: Surveyor		Date: 11/7/00		Title: SR. DRUG. ENGR.		Date: 3/20/01	
Signature: Greg Thomas / DCWeekes				Signature: J. Auten			

MAR 15 2001



WELL SUMMARY SHEET		Page <u>1</u> of <u>2</u>	
		Date: <u>11/7/00</u>	
Well ID: <u>C 3113</u>	Well Name: <u>Z99-W23-21</u>		
Location: <u>West of 241 Sx Tank Farm</u>	Project: <u>RCRA FY 2000 Drilling</u>		
Prepared By: <u>G.S. Thomas</u>	Date: <u>11/7/00</u>	Reviewed By: <u>DC Weekes</u>	Date: <u>12/20/00</u>
Signature: <u>[Signature]</u>	Signature: <u>[Signature]</u>		
CONSTRUCTION DATA		GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram	Depth in Feet	Lithologic Description
6-in diameter protective ss casing set 1.0' above the 4-in casing		0	0-0.5': Gravel
			0.5'-8.5': Sand
			8.5'-20.0': Sand to Slightly Silty Sand
4-in ID schd. 5, ss 304L well casing: +2.10' → 212.58' bgs		25	20.0'-36.8': Sandy Gravel
Portland Cement Grout: 0' → 10.1'			36.8'-38.5': Silty Sand
			38.5'-40.0': Slightly Gravelly Sand
Granular Bentonite 10.1' → 193.7'		50	40.0'-80.0': Sand
			80.0'-82.0': Gravelly Sand
Temporary Casing: 11 3/4" / 10 3/4" set at 76.41'			82.0'-88.0': Silty Sand
8 5/8" / 7 5/8" to 253.5'			88.0'-99.0': Gravelly Sand
		100	99.0'-120.5': Sand
			120.5'-130.5': Silty Sand
		125	130.5'-131.5': Sandy Silt
			131.5'-139.0': Silty Sand
		139.0'-141.5': Slightly Silty Sand	
		141.5'-143.5': Silty Sand	
		143.5'-147.0': Slightly silty sand	

[Signature]

WELL SUMMARY SHEET

Date: 11/7/00

Well ID: <u>C 3113</u>	Well Name: <u>299-W23-21</u>
Location: <u>west side of 241 SX Tank Farm</u>	Project: <u>RCRA FY 2000 Drilling</u>
Prepared By: <u>G.S. Thomas</u>	Date: <u>11/7/00</u>
Reviewed By: <u>DC Weekes</u>	Date: <u>12/20/00</u>
Signature: <u>G.S. Thomas</u>	Signature: <u>DC Weekes</u>

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA		
Description	Diagram		Graphic Log	Lithologic Description	
Bentonite Pellets: 193.7' - 202.0'		150		147'-153': Sandy Silt 153'-158': Slightly Silty Gravelly Sand	
Silica Sand: 10-20 mesh 202.0' - 257.5'		175		158'-168': Sand 168'-189': Sandy Gravel	
Well Screen 4-in ID, 0.020-in. slot Cont. wire-wrap, SS type 304: 212.50' → 249.69'		200		189'-193': Slightly Silty Gravelly Sand 193'-197.5': Gravelly Silty Sand 197.5'-204': Gravelly Sandy Silt N.L. = 212.88' bgs (11/3/00)	
Sump: 4 in ID SS 304 L 249.69' → <u>251.87'</u>		225		204'-214': Silty Sandy Gravel 214'-219': Gravelly Sandy Silt 219'-240': Silty Sandy Gravel	
Total 4 in ID SS material is 253.97' (+2.10' + 251.87')		250		240'-255': Sandy Gravel 255'-259': Gravelly Silty Sand TD 259'	
All depths in feet below ground surface All temp. casing removed from the ground					



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